HYPERBARIC OXYGENATION IN WOUND HEALING AND EXPERIMENTAL GRANULOMA

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The present work was prompted by the favourable effect of 35—70 per cent oxygen (at 1 atm) in the breathing atmosphere on the wound healing (Kulonen, E. et al.: Acta physiol. scand. 70, 112, 1967) and by the contradictory reports in the literature about the influence of hyperbaric oxygenation on the scar formation.

Viscose cellulose-sponges (four pieces, 20 × 10 × 10 mm each) were implanted subcutaneously in the backs of adult male Sprague—Dawley rats (about 200 g). They were kept intermittently for 2 × 2 h daily in pure oxygen at 2 atm absolute pressure after the first postoperative night in a hyperbaric animal chamber (Vickers Research Establishments, Sunninghill, Berks, England). The rats were killed after 4 or 10 days. The tensile strength (TS) of the healing skin wounds (g/cm) and the granulomas (g/cm^2) was determined according to Viljanto (Acta chir. scand. Suppl. 333, 1964).

After 4 days at normal atmosphere TS was for wounds 112 ± 6 g/cm (19 rats) and for granulomas 55 ± 3 g/cm^2 (19), but after treatment in hyperbaric oxygen TS for wounds was 91 ± 4 g/cm (19) and for granulomas 46 ± 2 g/cm^2 (20). Ten days after implantation the respective figures were at normal atmosphere for wounds 864 ± 22 g/cm (16) and for granulomas 357 ± 17 g/cm^2 (19), and in hyperbaric oxygen for wounds 659 ± 11 g/cm (16) and for granulomas 293 ± 15 g/cm^2 (20). The variances between the groups were larger than within the groups ($P < 0.0005$) for both wounds and granulomas.

Chemical analyses of the granulomas confirmed that the impairment of hyperbaric oxygenation on the tensile strength depends on the corresponding changes in the amounts of collagen hydroxyproline. In hyperbaric conditions the optimal effect of oxygen therapy on wound healing (about 70 per cent O_2 at 1 atm) is passed.

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